NASA CR-
140300

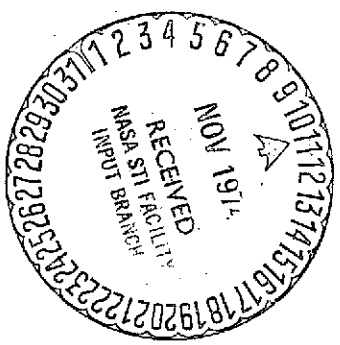
FINAL REPORT

PROBABILITY OF ILLNESS DEFINITION FOR THE SKYLAB FLIGHT CREW HEALTH STABILIZATION PROGRAM

CONTRACT NUMBER NAS 9-12783

JOHNSON SPACE CENTER

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION



THE UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER AT HOUSTON

SCHOOL OF PUBLIC HEALTH

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1. Introduction

Monitoring the kind and numbers of microorganisms present at certain sites on spacecraft crewmembers and their quarters provides information about two important aspects of the crew's health status. First, observations taken prior to flight could reveal the presence of pathogens which could cause illness during flight and second, changes in microflora due to special conditions imposed by spaceflight such as isolation, diet and weightlessness, could be indicated by comparison of pre- and postflight data. Such data were collected during the Apollo flights and that practice, with some refinement, was continued for SMEAT and Skylab.

This project was concerned with the management and analysis of crew and environmental microbiological data from SMEAT and Skylab. Samples were collected from ten different body sites on each SMEAT and Skylab crewmember on approximately 50 occasions and since several different organisms could be isolated from each sample, several thousand lab reports were generated. These lab reports were coded and entered in a computer file and from the file various tabular summaries were constructed. Data presented in this form could be more easily interpreted and statistical analyses more readily performed.

The data management system was begun in May of 1972 with the initial decisions about the content and format of the Microbiology Data Forms to be used to transfer information from the microbiology labs to keypunch and thence to the computer files. As the files grew with the accumulation of SMEAT reports, data grooming techniques were developed and the first draft summary tables were constructed after consultation with Dr. J. L. McQueen, Task Monitor, and other JSC personnel. After a few month's experience a

suitable data handling system and report format evolved and from that point on, the major effort was in keeping up with the volume of reports and maintaining the accuracy of the entries.

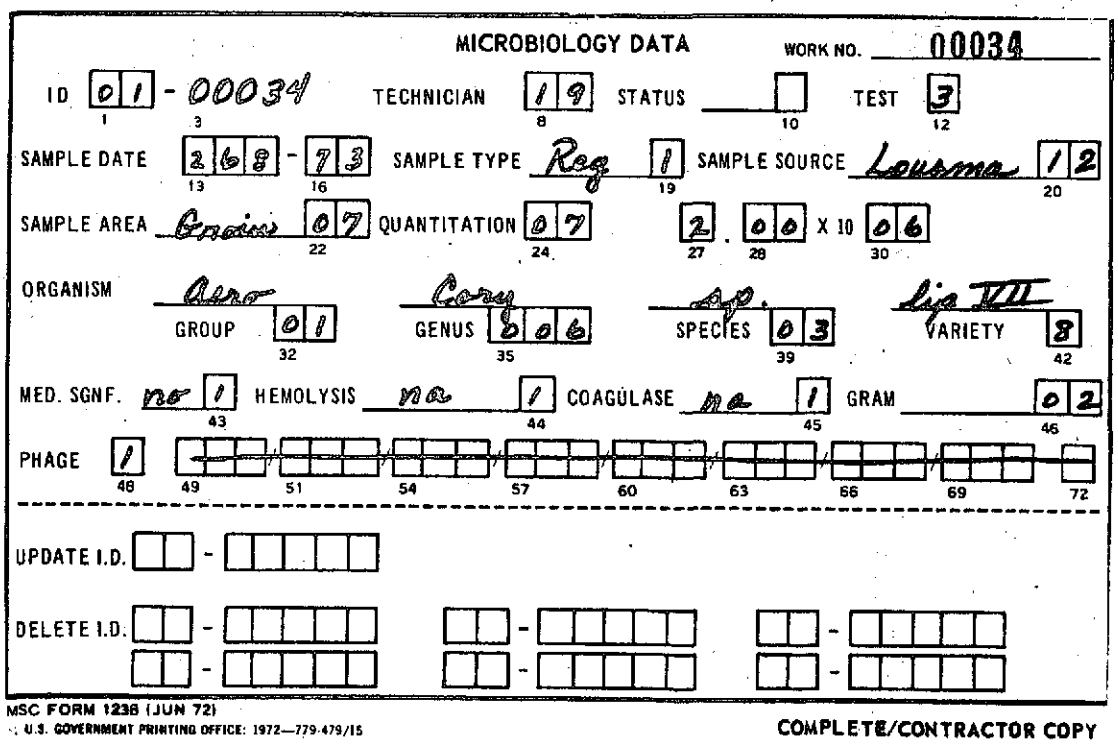
As the summary tables were produced, they were given to JSC microbiologists. Statistical consulatation was provided upon request and the results of these investigations published in various reports.

This final report contains a detailed description of this system and its operation along with the resulting summaries and analyses of the microbiology data. Computer tapes containing the various data bases and the programs developed during the course of this contract have already been furnished to JSC.

2. Data Management System

a. Organization

Associated with each sample processed by the microbiology lab is information concerning the sample date, type, source and area as well as the identity and quantity of organisms detected. Unique numerical codes were assigned to each of these items, including the names of several hundred microorganisms. These codes, as well as prose descriptions were entered by the lab personnel on MSC Form 1238, illustrated in Figure 1.


MICROBIOLOGY DATA WORK NO. 00034

ID 01 - 00034 TECHNICIAN 19 STATUS TEST 3

SAMPLE DATE 268 - 73 SAMPLE TYPE Reg 1 SAMPLE SOURCE Lousma 12

SAMPLE AREA Groin 07 QUANTITATION 07 2.00 X 10 06

ORGANISM Aero GROUP 01 Cory GENUS 606 sp. SPECIES 03 Lip VII VARIETY 8

MED. SGNF. no 1 HEMOLYSIS na 1 COAGULASE na 1 GRAM 02

PHAGE 1

UPDATE I.D.

DELETE I.D.

MSC FORM 1238 (JUN 72)
U.S. GOVERNMENT PRINTING OFFICE: 1972—779-479/15

COMPLETE/CONTRACTOR COPY

Figure 1 - MSC Form 1238

Instructions for completion of this form and the disposition of the various copies were given to the lab personnel and all others involved in the use of the system. These instructions appear in the Appendix to this report, Microbiology Data Form Instructions.

Once the forms were completed, one copy (COMPLETE/MSC) was sent to be keypunched and verified and then returned to a file maintained at JSC. The forms were filed by ID number (columns 1-7) within SMEAT and each Skylab flight. This file will be returned to JSC at the end of the contract.

The cards keypunched from the Microbiology Data forms were read into computer files at University of Texas at Houston Education and Research Computer Center (UTHERRC). Editing of these files was then accomplished from a terminal located at JSC.

Summary tables generated from these files were printed at M. D. Anderson Hospital (the line printer there was best suited to our purposes) and delivered to JSC.

The essential steps in the data handling procedures are illustrated in Figure 2.

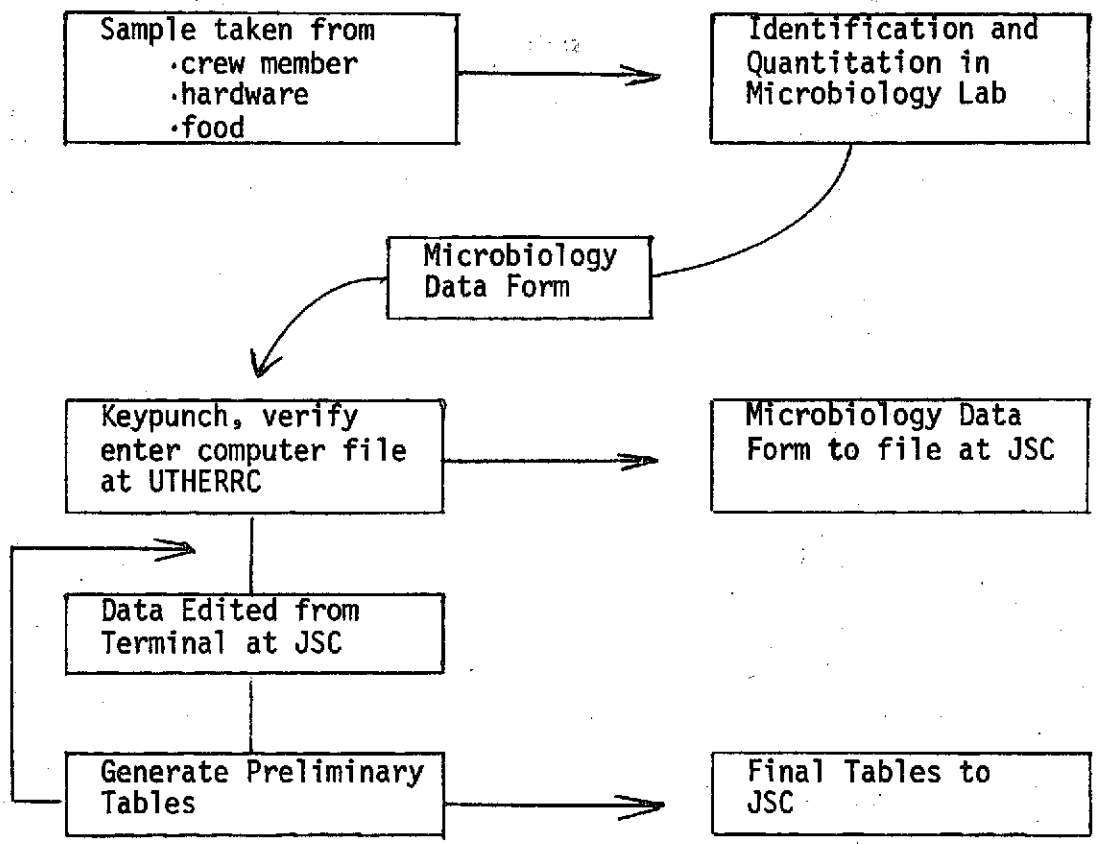


Figure 2 - Data Management System

b. SMEAT and Skylab Data Bases

Separate computer files were established for SMEAT, SMEAT food, and each of the three Skylab flights. After the data were entered in the system, preliminary data editing procedures were used to detect the presence of incomplete or duplicate reports.

To insure the completeness of the computer files, each of the crew microbiology records was matched with the corresponding Microbiology Data Form and all inconsistencies were resolved. The accuracy of the coded information was checked by randomly selecting 237 cards and comparing each of the 48 columns used on each card with the corresponding entry in the computer record. Of the approximately 11,376 entries thus checked, only four were found to be in error.

As the files were readied, tape copies were made and delivered to JSC for use on computers located there. Table 1 lists the various data bases, their source and the number of records (Microbiology Data reports) in each.

Data Base	Source	Records
SMEAT1	SMEAT	4221
SMFOOD	SMEAT Food	289
SL2DB	SL 2	2035
SL3DB	SL 3	1546
SL4DB	SL 4	1432
TOTAL		9523

Table 1 - Microbiology Data Bases

c. Summary Tables

As experience with the system was gained, it appeared that two basic types of summary tables, the Incidence and Quantitation Tables, would be most helpful in analysing the data.

The Incidence Table, illustrated in Figure 3, reports the presence (by a 1) of given organisms by date, astronaut and sample site. These tables were also used to detect duplicate entries since only Staph.aureus (differentiated by phage type) can be reported more than once at a given location and time.

Flight, Astronaut, Sample Site					
Sample Date	1	2	3	4	Total
Organism 1	0	1	1	0	2
Organism 2	1	0	1	0	2
Organism 3	0	0	0	1	1
Genus Total	1	1	2	1	

Figure 3 - Incidence Table Format

The names (genus, species, variety) of the organisms present are listed in alphabetical order within each of the four groups (aerobic bacteria, anaerobic bacteria, filamentous fungi, yeast) as indicated in Appendix A of the Microbiology Data Form Instructions. Within each group, the organisms are divided by genus and column totals for both genera and groups are printed. Row totals for each organism are also printed.

Quantitation Tables are organized in the same way with the report of incidence (0 or 1) being replaced by the count (quantitation) of the organism. In a few instances, the presence of an organism was noted, but because of some special circumstance in the lab, the quantitation was not obtained. In these few cases, these organisms appear in the Incidence Table but not in the corresponding Quantitation Table. Figure 4 illustrates the organization of the Quantitation Tables.

Flight, Astronaut, Sample Site				
Sample Date	1	2	3	Total
Organism 1	.3000E+03	.5100E+02	0.	.351E+03
Organism 2	0.	0.	.1000E+02	.100E+02
Organism 3	.7700E+04	.9000E+02	.1000E+03	.789E+04
Genus Total	.800E+04	.141E+03	.110E+03	

Figure 4 - Quantitation Table Format

For each flight, astronaut and sample site, both Incidence and Quantitation Tables were constructed. In addition, composite tables for the seven skin sites were made for each astronaut and a composite table for each sample site over the three astronauts was made for each flight.

The crew microbiology tables show both incidence and quantitation of organisms for the sample sites indicated in Table 2.

7 Skin Sites	(composite of those below)
Skin Site 1	(Neck)
Skin Site 3	(Ear)
Skin Site 4	(Axilla)
Skin Site 5	(Hands)
Skin Site 6	(Umbillicus)
Skin Site 7	(Groin)
Skin Site 8	(Toe Web)
Gargle	
Nasal	
Feces	

Table 2 - Crew Microbiology Sample Sites

Tables showing incidence of microorganisms in SMEAT food were also generated.

Due to space limitations on the computer paper (particularly for the Quantitation Tables) it was necessary to break these individual tables into as many as five different segments. These segments are bound together and accompanied by an index indicating the arrangement in each instance. This collection of tables will be presented to the JSC task monitor at the end of the contract period.

To simplify coding and calculations, Julian dates were used throughout the data management system. Table 3 shows the number of sample dates for each flight and Tables 4, 5, 6, and 7 show the actual dates of each sample.

	Preflight	Intraflight	Postflight
SMEAT	12	8	8
Skylab 2	5	0	3
Skylab 3	4	0	3
Skylab 4	5	0	3

Table 3 - Number of Sample Dates for SMEAT and Skylab

	S	M	T	W	T	F	S	Sample	Closure Date
1972									
May	7	8	9	**131**	11	12	13	F	T-77(First
	14	15	16	**138**	18	19	20		T-70 Samples)
	21	22	23	**145**	25	26	27	F	T-63
June	28	29	30	**152**	1	2	3		T-56
	4	5	6	**159**	8	9	10	F	T-49
	11	12	13	**166**	15	16	17		T-42
	18	19	20	**173**	22	23	24	F	T-35
	25	26	27	**180**	29	30	1		T-28
July	2	3	4	**187**	6	7	8	F	T-21
	9	10	11	**194**	13	14	15		T-14
	16	17	18	**201**	20	21	22		T-7
	23	24	25	**208**	27	28	29	F	C+0 (Chamber closed)
August	30	31	1	**215**	3	4	5	F	C+7
	6	7	8	**222**	10	11	12		C+14
	13	14	15	**229**	17	18	19	F	C+21
	20	21	22	**236**	24	25	26		C+28
September	27	28	29	**243**	31	1	2	F	C+35
	3	4	5	**250**	7	8	9		C+42
	10	11	12	**257**	14	15	16		C+49
	17	18	19	**264**	21	22	23		C+56 (Chamber
	24	25	26	**271**	28	29	30		R+7 opened)
October	1	2	3	**278**	5	6	7		R+14
	8	9	10	**285**	12	13	14		R+21
	15	16	17	**292**	19	20	21		R+28
	22	23	24	**299**	26	27	28		R+35
November	29	30	31	**306**	2	3	4		R+42
	5	6	7	**313**	9	10	11		R+49
	12	13	14	**320**	16	17	18		R+56

Table 4 - SMEAT Calendar (Julian Sample Date in BOLD TYPE)

	S	M	T	W	T	F	S	
1973								
March	11	12	13	14	**74**	16	17	
	18	19	20	21	22	23	24	
	25	26	27	28	29	30	31	
April	1	2	3	4	5	6	7	
	8	9	10	11	12	13	14	
	15	**106**	17	18	19	20	21	
	22	23	24	25	26	27	28	
May	29	30	**121**	2	3	4	5	
	6	7	8	9	10	**131**	12	
	13	14	15	16	17	18	19	
	20	21	22	23	24	**145**	26	Launch II
June	27	28	29	30	31	1	2	
	3	4	5	6	7	8	9	
	10	11	12	13	14	15	16	
	17	18	19	20	21	**173**	23	Recovery II
	24	25	26	27	28	**180**	30	
July	1	2	3	4	5	6	7	
	8	**190**	10	11	12	13	14	

Table 5 - Skylab II Calendar (Julian Sample Date in BOLD TYPE)

1973	S	M	T	W	T	F	S	
June	10	11	12	**164**	14	15	16	
	17	18	19	20	21	22	23	
	24	25	26	27	28	29	30	
July	1	2	3	4	5	6	7	
	8	9	10	11	**193**	13	14	
	15	16	17	18	19	20	21	
	22	**204**	24	25	26	27	**209**	Launch III
August	29	30	31	1	2	3	4	
	5	6	7	8	9	10	11	
	12	13	14	15	16	17	18	
	19	20	21	22	23	24	25	
September	26	27	28	29	30	31	1	
	2	3	4	5	6	7	8	
	9	10	11	12	13	14	15	
	16	17	18	19	20	21	22	
	23	24	**268**	26	27	28	29	Recovery III
October	30	1	2	3	**277**	5	6	
	7	8	9	10	11	12	13	
	14	**288**	16	17	18	19	20	

Table 6 - Skylab III Calendar (Julian Sample Dates in BOLD TYPE)

	S	M	T	W	T	F	S	
1973								
August	19	20	**239**	22	23	24	25	
September	26	27	28	29	30	31	1	
	2	3	4	5	6	7	8	
	9	10	11	12	13	14	15	
	16	17	18	19	20	21	22	
	23	24	25	26	27	28	29	
October	30	1	2	3	4	5	6	
	7	8	9	10	11	**285**	13	
	14	15	16	17	18	19	20	
	21	22	23	24	25	**299**	27	
November	28	29	30	31	1	2	3	
	4	5	**310**	7	8	9	10	
	11	12	13	14	15	**320**	17	Launch IV

1974								
February	3	4	5	6	7	**39**	9	Recovery IV
	10	11	12	13	14	15	16	
	17	18	**50**	20	21	22	23	
March	24	**56**	26	27	28	1	2	

Table 7 - Skylab IV Calendar (Julian Sample Date in BOLD TYPE)

d. Computer Programs

The main purpose of the computer programs generated in the course of this contract was to tabulate and print information selected from the rather large data files. These programs were copied on tape and delivered to the JSC task monitor. The UT programmer provided consultation to JSC programmers to enable them to run the programs on the JSC computer system. Sample data bases were also provided to check the programs. These programs are now operational on the JSC system.

3. Personnel

The time of the principal investigator, Dr. Thomas D. Downs, was furnished without cost to the project. Nine other individuals were involved as indicated in Table 8.

Employee	Job	Employed	Terminated
Bradley, Joyce	Secretary II	4-26-73	7-17-73
Dunn, Kay	Research Statistical Aide	6-18-73	9-16-73
Green, Stacy (Welker)	Research Statistical Aide	8-2-73	5-27-74
Harrist, Ronald	Biostatistican	5-1-72	8-31-74
Hokanson, James	Programmer II	6-1-72	6-7-74
Ward, Mary	Research Statistical Aide	4-30-73	7-31-73
West, Stewart	Research Statistical Aide	6-18-73	6-30-74
Wiggins, Gretchen	Secretary II	7-5-72	5-2-73
Wilcox, Beverly	Secretary II	9-17-73	9-30-74

Table 8 - Personnel

APPENDIX A

ORGANISM CODES

01 - AEROBIC BACTERIA

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Aeromonas	hydrophilia		001	02	1
	shigelloides		001	03	1
Alcaligenes	species		002	01	1
Bacillus	alvei		003	11	1
	badius		003	02	1
	brevis		003	12	1
	cereus		003	03	1
	circulans		003	18	1
	coagulans		003	04	1
	firmis		003	05	1
	lateroparus		003	19	1
	lentus		003	06	1
	licheniformis		003	07	1
	macerans		003	20	1
	megaterium		003	08	1
	mycoides		003	09	1
	pantothenticus		003	21	1
	pasteurii		003	15	1
	pumilus		003	14	1
	sphaericus		003	13	1
	stearothermophilus		003	17	1

01 - AEROBIC BACTERIA

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Bacillus	stearothermophilus	55°C	003	17	2
	subtilis		003	10	1
	species		003	01	1
	species	55°C	003	22	1
	species	2030	003	01	2
	species	1010	003	01	3
	species	1040	003	01	4
	species	900	003	01	5
	species	1000	003	01	6
	species	1041	003	01	7
	species	1050	003	01	8
	species	1063	003	01	9
	species	1090	003	41	1
	species	1081	003	41	2
	species	1080	003	41	3
	species	1030	003	41	4
	species	1061	003	41	5
Citrobacter	species		004	01	1
Corynebacterium	pyogenes		006	02	1
	species	lipopholic group I	006	03	1
			006	03	2
		II	006	03	3

01 - AEROBIC BACTERIA

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Corynebacterium		III	006	03	4
		IV	006	03	5
		V	006	03	6
		VI	006	03	7
		VII	006	03	8
	species	Evan's group A	006	04	2
		B	006	04	3
		C	006	04	4
		D	006	04	5
		E	006	04	6
		F	006	04	7
		G	006	04	8
	species		006	01	1
Diplococcus	pneumoniae		007	02	1
Enterobacter	aerogenes		008	02	1
	cloacae		008	03	1
	hafniae		008	04	1
	liquefaciens		008	05	1

01 - AEROBIC BACTERIA

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Enterococcus	species		039	01	1
Escherichia	coli		009	02	1
	intermedia		009	03	1
Erwinia	species		010	01	1
Flavobacterium	species		011	01	1
Haemophilus	influenzae	A	012	02	2
		B	012	02	3
		C	012	02	4
		D	012	02	5
		E	012	02	6
		F	012	02	7
		Non-typable	012	02	8

01 - AEROBIC BACTERIA

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Haemophilus	haemolyticus		012	03	1
	parahaemolyticus		012	04	1
	parainfluenzae		012	05	1
	species		012	01	1
	aprophilies		012	06	1
Herella	vaginicola		013	02	1
	species		013	01	1
Klebsiella	pneumoniae		014	02	1
Lactobacillus	acidophilus		015	13	1
	brevis		015	03	1
	buchneri		015	04	1
	bulgaris		015	10	1
	casei	alactosus	015	15	3
		casei	015	15	2
		rhamnosus	015	15	4
	cellobiosus		015	05	1

01 - AEROBIC BACTERIA

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Lactobacillus	delbrueckii		015	12	1
	fermenti		015	02	1
	helveticus		015	08	1
	jugurti		015	07	1
	lactis		015	09	1
	leichmanii		015	11	1
	planterum		015	16	1
	salivarius	salicanius	015	14	3
		salivarius	015	14	2
	species		015	01	1
Micrococcus	subgroup	1	016	02	1
		2	016	03	1
		3	016	04	1
		4	016	05	1
		5	016	06	1
		6	016	07	1
		7	016	08	1
		8	016	09	1
	species		016	01	1
Mima	polymorpha		017	02	1
		oxidans	017	02	2

01 - AEROBIC BACTERIA

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Moraxella	nonliquefaciens		018	02	1
	saccharolytica		018	06	1
	species	I	018	03	1
		II	018	04	1
		IV	018	05	1
	species		018	01	1
Neisseria	catarrhalis		019	02	1
	caviae		019	03	1
	flava		019	04	1
	flavescens		019	05	1
	gonorrhoeae		019	06	1
	haemolysans		019	07	1
	meningitidis		019	08	1
	perflava		019	09	1
	subflava		019	10	1
	sicca		019	11	1
	species		019	01	1
Paracolobactrum	aerogenoides		020	02	1
	arizonae		020	03	1
	coliforme		020	04	1
	intermedium		020	05	1

01 - AEROBIC BACTERIA

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Pasteurella	species		021	01	1
Pectobacterium	species		022	01	1
Proteus	mirabilis		023	02	1
	morganii		023	03	1
	rettgerii		023	04	1
	vulgaris		023	05	1
Providencia	alcalifaciens		024	02	1
	stuartii		024	03	1
Pseudomonas	aeruginosa		025	02	1
	fluorescens		025	05	1
	maltophilia		025	03	1

01 - AEROBIC BACTERIA

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Pseudomonas	stutzeri		025	04	1
	species		025	01	1
Rothia	species		026	01	1
Salmonella	species		027	01	1
Sarcina	species	1	038	01	1
	species	2	038	01	2
	species	3	038	01	3
Serratia	marcescens	pigmented	028	02	2
		non-pigmented	028	02	3

01 - AEROBIC BACTERIA

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Shigella	species		029	01	1
Staphylococcus	aureus		030	02	1
	epidermidis	II	030	03	2
		III	030	03	3
		IV	030	03	4
		V	030	03	5
		VI	030	03	6
		unidentified	030	03	1
	species		030	01	1
Streptococcus	bovis		031	05	1
	faecalis		031	02	1
		liquifaciens	031	02	2
		zymogenes	031	02	3
	mitis		031	03	1
	salivarius		031	04	1
	species	Group A	031	01	2
		Not Group A	031	01	3
		alpha hemolytic	031	01	4
		gamma hemolytic	031	01	5

01 - AEROBIC BACTERIA

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Unidentified	NCDC group	Ia	035	02	1
		Ib	035	03	1
		IIa	035	14	1
		IIb	035	15	1
		IIIa	035	04	1
		IIIb	035	05	1
		IVc	035	06	1
		IVd	035	07	1
		IVe	035	08	1
		Va	035	16	1
		VI	035	13	1
		HB-1	035	09	1
		HB-5	035	10	1
		EO-1	035	11	1
		unknown	035	12	1
Unidentified	gram positive coccus		036	01	1
	gram negative rod		036	02	1
	gram positive rod		036	03	1

02 - ANAEROBIC BACTERIA

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Acidaminococcus	fermentans		001	02	1
Actinomyces	bovis		002	02	1
	israeli		002	03	1
	naeslundii		002	04	1
	viscosus		002	05	1
	species		002	01	1
Arachnia	propionica		003	02	1
Bacteroides	amylophilus		004	02	1
	biacutus		004	03	1
	capillosus		004	04	1
	clostridiiformis	clostridiiformis	004	05	2
	clostridiiformis	girans	004	05	3
	coagulans		004	06	1
	corrodens		004	07	1
	fragilis		004	08	1
	fragilis	distasonis	004	08	2

02 - ANAEROBIC BACTERIA

			COLUMNS		
GENUS	SPECIES	VARIETY	35,36,37	39,40	42
Bacteroides	fragilis	fragilis	004	08	3
	fragilis	ovatus	004	08	4
	fragilis	thetaiotaomicron	004	08	5
	fragilis	vulgatus	004	08	6
	furcosus		004	09	1
	hypermegas		004	10	1
	melaninogenicus	asaccharolyticus	004	11	2
	melaninogenicus	intermedius	004	11	3
	melaninogenicus	melaninogenicus	004	11	4
	nodosus		004	12	1
	oralis		004	13	1
	ochracens		004	14	1
	praeacutus		004	15	1
	pneumosintes		004	16	1
	putredinis		004	17	1
	ruminicola	brevis	004	18	2
	ruminicola	ruminicola	004	18	3
	succinogenes		004	19	1
	species		004	01	1
Bifidobacterium	adolescentis	A	005	02	2
		B	005	02	3
		C	005	02	4
		D	005	02	5
	asteroides		005	03	1
	bifidum		005	04	1
	breve (Syn. B. parvulorum)		005	05	1

02 - ANAEROBIC BACTERIA

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Bifidobacterium	cornutum (Syn. Eubacterium cornutum)		005	06	1
	dentium group		005	07	1
	eriksonii (Syn. Actinomyces eriksonii)		005	08	1
	infantis	infantis	005	09	2
	infantis	lactentis	005	09	3
	infantis	liberorum	005	09	4
	infantis		005	09	1
	longum	longum	005	10	2
	pseudolongum (Syn. B. globusum and B. longum ss animalis)		005	11	1
	thermophilum (Syn. B. runinale)		005	12	1
	species		005	01	1
Butyrivibrio	fibrisolvens		007	02	1
Clostridium	acetobutylicum		008	02	1
	aminovalericum		008	03	1
	aurantibutyricum		008	04	1
	barati		008	05	1
	barkeri		008	06	1

02 - ANAEROBIC BACTERIA

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Clostridium	beijerinckii		008	07	1
	bifermentans		008	08	1
	botulinum	AFB	008	09	2
	botulinum	BEF	008	09	3
	botulinum	CD	008	09	4
	botulinum	G (type)	008	09	5
	butyricum		008	10	1
	cadaveris		008	11	1
	carnis		008	12	1
	cellobioparum		008	13	1
	chauvoei		008	14	1
	cochlearium		008	15	1
	difficile		008	16	1
	fallax		008	17	1
	felsineum		008	18	1
	ghoni		008	19	1
	glycolicum		008	20	1
	haemolyticum		008	21	1
	hastiforme		008	22	1
	histolyticum		008	23	1
	indolis		008	24	1
	innocuum		008	25	1
	inulinum		008	26	1
	irregularis		008	27	1
	lentoputrescens		008	28	1
	limosum		008	29	1
	litus-eburense		008	30	1
	malenominatum		008	31	1
	mangenoti		008	32	1
	novyi	A	008	33	1
	novyi	B	008	33	2

02 - ANAEROBIC BACTERIA

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Clostridium	oceanicum		008	35	1
	oroticum		008	36	1
	paraputrificum		008	37	1
	pasteurianum		008	38	1
	perenne		008	39	1
	perfringens		008	40	1
	plagarum		008	41	1
	propionicum		008	42	1
	pseudotetanicum		008	43	1
	putrefaciens		008	44	1
	purificum		008	45	1
	ramosum		008	46	1
	rectum		008	47	1
	rubrum		008	48	1
	sardiniensis		008	49	1
	sartagoformum		008	50	1
	scatologenes		008	51	1
	speticum		008	52	1
	sphenoides		008	53	1
	sordellii		008	54	1
	sporogenes		008	55	1
	sporosphaeroides		008	56	1
	sticklandii		008	57	1
	subterminale		008	58	1
	tertium		008	59	1
	tetani		008	60	1
	thermosaccharolyticum		008	61	1
	tyrobutyricum		008	62	1
	species		008	01	1

02 - ANAEROBIC BACTERIA

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Eubacterium	aerofaciens		009	02	1
	alactolyticum		009	03	1
	budayi (Syn. E. adaveris)		009	04	1
	cellulosolvens		009	05	1
	combesii		009	06	1
	contortum		009	07	1
	cylindroides		009	08	1
	lentum		009	09	1
	limosum		009	10	1
	moniliforme		009	11	1
	multiforme		009	20	1
	nitritogenes		009	13	1
	rectale		009	14	1
	ruminantium		009	15	1
	saburreum		009	16	1
	tenue		009	17	1
	tortuosum		009	18	1
	ventriosum		009	19	1
	species		009	01	1
Fusobacterium	bullosum		010	02	1
	glutinosum		010	03	1
	gonidiaformans		010	04	1
	mortiferum		010	05	1
	naviforme		010	06	1
	necrogenes		010	07	1
	necrophorum		010	08	1

02 - ANAEROBIC BACTERIA

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Leptotrichia	buccalis		014	02	1
Megasphaera	elsdenii (Syn. Peptostreptococcus elsdenii)		015	02	1
Peptococcus (PC)	asaccharolyticus		016	02	1
	constellatus		016	03	1
	magnus (formerly Peptostreptococcus magnus)		016	04	1
	morbillorum		016	05	1
	prevotii		016	06	1
	saccharolyticus		016	07	1
	variabilis		016	08	1
	species		016	01	1
Peptostreptococcus (PS)	anaerobius		017	02	1
	intermedius		017	03	1
	micros		017	04	1

02 - ANAEROBIC BACTERIA

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Fusobacterium	novum		010	09	1
	nucleatum		010	10	1
	plauti		010	11	1
	prausnitzii		010	12	1
	russii		010	13	1
	symbiosum (Syn. Bacteriodes symbiosus)		010	14	1
	varium		010	15	1
	species		010	01	1
Gaffkya	anaerobia		011	02	1
Lachnospira	multiparus		012	02	1
Lactobacillus	catenaforme		013	02	1
	minutus (Syn. Eubacterium minutum)		013	03	1
	species		013	01	1

02 - ANAEROBIC BACTERIA

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Peptostreptococcus (PS)	parvulus		017	05	1
	productus		017	06	1
	species		017	01	1
Propionibacterium	acidipropionici		018	02	1
	acnes		018	03	1
	avidum		018	04	1
	freudenreichii	freundenreichii	018	05	1
	freudenreichii	globosum	018	06	1
	freudenreichii	shermanii	018	06	2
	granulosum		018	07	1
	jensenii		018	08	1
	lymphophilum		018	10	1
	thoenii		018	09	1
	species		018	01	1
Ruminococcus	albus		019	02	1
	bromii		019	03	1
	flavefaciens		019	04	1

02 - ANAEROBIC BACTERIA

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Sarcina	ventriculi		020	02	1
Selenomonas	ruminantium		021	02	1
	sputigena		021	03	1
Staphylococcus	epidermidis	unidentified	030	03	1
Succinimonas (SM)	amylolytica		022	02	1
Succinivibrio (SV)	dextrinosolvens		023	02	1

02 - ANAEROBIC BACTERIA

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Unidentified	gram positive rod		025	01	1
	gram negative rod		025	02	1
	gram positive coccus		025	03	1
	gram negative rod	8737	025	02	2
	gram negative rod	8739	025	02	3
Veillonella	alcalescens		024	02	1
	parvula		024	03	1
	species		024	01	1

03 - YEAST

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Brettanomyces	species		001	01	1
Bullera	alba		002	02	1
	species		002	01	1
Candida	albicans		003	02	1
	claussenii		003	10	1
	guilliermondii		003	03	1
	krusei		003	04	1
	parapsilosis		003	05	1
	pseudotropicalis		003	06	1
	ravautii		003	13	1
	rugosa		003	12	1
	solani		003	11	1
	stellatoidea		003	07	1
	tropicalis		003	08	1
	vini		003	09	1
	species		003	01	1
Citeromyces	species		004	01	1

03 - YEAST

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Coccidiascus	species		005	01	1
Cryptococcus	albidus	albidus	006	02	2
	albidus	diffluens	006	02	3
	ater		006	09	1
	gastricus		006	03	1
	laurentii	laurentii	006	04	1
	laurentii	magnus	006	04	2
	luteolus		006	05	1
	macerans		006	08	1
	neoformans		006	06	1
	uniguttulatus		006	07	1
	species		006	01	1
Dekkera	species		008	01	1
Endomycopsis	burtonii		009	02	1
	species		009	01	1

03 - YEAST

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Hanseniasposa	species		010	01	1
Hansenula	species		011	01	1
Kloeckera	species		012	01	1
Kluyveromyces	species		013	01	1
Leucosporidium	species		014	01	1
Lipomyces	species		015	01	1
Lodderomyces	species		016	01	1
Meschnikowia	species		017	01	1
Nadsonia	species		018	01	1
Oosporidium	species		019	01	1
Pachysolen	species		020	01	1

03 - YEAST

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Pichia	species		021	01	1
	ohmeri		021	02	1
Pityrosporum	orbiculare		022	02	1
	ovale		022	03	1
Rhodosporidium	species		023	01	1
Rhodotorula	aurantiaca		024	07	1
	flava		024	05	1
	glutinis		024	02	1
	glutinis	glutinis	024	02	2
	graminis		024	12	1
	lactosa		024	09	1
	marina		024	11	1
	minuta	minuta	024	08	1
		texensis	024	08	2
	mucilaginosa		024	04	1
	pallida		024	06	1
	pilimanae		024	10	1
	rubra		024	03	1
	species		024	01	1

03 - YEAST

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Saccharomyces (SE)	cerevisiae		025	02	1
	cheualieri		025	04	1
	rosei		025	03	1
Saccharomycodes (SD)	species		026	01	1
Saccharomycopsis (SP)	species		027	01	1
Schizoblastosporion	species		028	01	1
Schizosaccharomyces	species		029	01	1

03 - YEAST

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Schwanniomyces	species		030	01	1
Sporidiobolus	species		031	01	1
Sporobolomyces	holsaticus		032	02	1
	roseus		032	03	1
	species		032	01	1
Sterigmatomyces	species		033	01	1
Torulopsis	aeria		034	09	1
	candida		034	02	1
	castellii		034	07	1
	famata		034	04	1
	glabrata		034	03	1
	haemulonii		034	05	1
	holmii		034	08	1
	igeniosa		034	06	1
	stellata		034	10	1
	species		034	01	1

03 - YEAST

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Trichosporon	capitatum		035	02	1
	cutaneum		035	03	1
	penicillatum		035	04	1
	pullulans		035	05	1
Trigonopois	species		036	01	1
Wickerhamia	species		037	01	1
Wingea	species		038	01	1
Unidentified Yeast			039	01	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Acremonium	species		001	01	1
Acrostaphulus	species		002	01	1
Actinomucor	species		003	01	1
Alternaria	alternata		005	06	1
	citri		005	03	1
	longipes		005	04	1
	radacina		005	07	1
	tenuis TN		005	02	1
	tenuissima TS		005	05	1
	species		005	01	1
Ambulosporium	species		007	01	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Aphanoascus	fulvescens		008	02	1
	species		008	01	1
	species	(group 1)	008	03	1
	species	(group 4)	008	04	1
	species	(group 5)	008	05	1
Arthrinium	phaerospermum		009	03	1
	sacchri		009	02	1
Aschochyta	species		010	01	1
Aspergillus	aculeatus		011	02	1
	allahobodii		011	31	1
	ambiguus		011	42	1
	amsteladomi		011	36	1
	aureolatus		011	40	1
	awamori		011	03	1
	caesiellus		011	32	1
	caespitosus		011	04	1
	candidum		011	05	1
	candidus		011	39	1
	carneus		011	36	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Aspergillus	chevaliere		011	28	1
	eburneo-cremeus		011	41	1
	ficuum		011	06	1
	fischeri	spinosus	011	29	1
	flavus	columnaris	011	07	2
	flavus		011	07	1
	foetidus		011	08	1
	foetidus	pallidus	011	08	2
	fumigatus		011	09	1
	janus	brevis	011	34	2
	jaysonicus		011	27	1
	microcysticus		011	33	1
	montevidensis		011	38	1
	nidulans		011	10	1
	nidulans	noascosporic	011	11	3
	niger		011	12	1
	oryzae		011	43	1
	phoenicus		011	37	1
	pseudoglaucus		011	13	1
	pulvinus		011	14	1
	pulvinus	A	011	14	2
		B	011	14	3
		C	011	14	4
	punicium		011	15	1
	restrictus		011	16	1
	ruber		011	17	1
	sclerotiorum		011	30	1
	sulphureus		011	26	1
	sydowi		011	18	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Aspergillus	sydowi	A	011	18	2
		B	011	18	3
		C	011	18	4
		D	011	18	5
		E	011	18	6
		F	011	18	7
		G	011	18	8
	terreus		011	19	1
	terricola		011	20	1
	terricola	americana	011	21	1
	tonaphilus		011	25	1
	unquis		011	22	1
	uster		011	35	1
	versicolor		011	23	1
	versicolor	A	011	23	2
		B	011	23	3
		C	011	23	4
		D	011	23	5
		E	011	23	6
		F	011	23	7
		G	011	23	8
		H	011	23	9
		I	011	23	10
		J	011	23	11
		K	011	23	12
	viridinutans		011	24	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Aureobasidium	mansonii		012	02	1
	pullulans		012	03	1
	species		012	01	1
Beauveria	species		112	01	1
Beniowskia	sphaevoidea		012	02	1
Bipolaris	maydis		014	02	1
	species		014	01	1
Botrytis	allii		109	03	1
	cinerea		109	02	1
Cephaloascus	fragrans		136	02	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Cephalosporium	acremonium		015	02	1
	incoloratum		015	03	1
	roseum	brevis	015	04	4
	roseo-griseum		015	05	1
	species		015	01	1
Cercospora	species		017	01	1
Ceratocystis	species		113	01	1
Cirincella	tenellus		116	02	1
Chaetomium	globosum		018	02	1
	indicom		018	04	1
	mollicellum		018	05	1
	spiculipilium		018	03	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Chaetophoma	species		019	01	1
Chrondroplea	populea		139	02	1
Chrysosporium	keratinophilum		020	06	1
	species 1		020	03	1
	species 2		020	04	1
	species 3		020	05	1
	tropicum		020	02	1
Cladorrhinum	species		021	01	1
Cladosporium	avellaneum		022	02	1
	carpophilum		022	03	1
	cladospoioides		022	04	1
	colocasiae		022	05	1
	cucumerinum		022	06	1
	elatum		022	07	1
	herbarum		022	08	1
	macrocarpum		022	09	1
	pallidum		022	10	1
	sphaerospermum		022	11	1
	werneckii		022	12	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Coniella	species		023	01	1
Coniothyrium	species		024	01	1
Cornularia	species		120	01	1
Curvularia	erogrostidis		025	08	1
	intermedius		025	02	1
	lunata		025	03	1
	lunata	aeria	025	03	2
	oryzae		025	07	1
	pallescens		025	04	1
	senegalensis		025	05	1
	trifolii		025	06	1
Cylindrocephalum	species		123	01	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Diplococcium	spicatum		026	02	1
	species		026	01	1
Drechslera	australiensis		114	04	1
	erythrospila		114	03	1
	hawaiiensis		114	02	1
	monocerus		114	05	1
Ectosticta	species		027	01	1
Emericellopsis	minima		028	02	1
	terrieda		028	03	1
	species		028	01	1
Epicoccum	nigrum		029	02	1
	purpurascens		029	03	1
	species		029	01	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Epidermophyton	floccosum		030	02	1
Fonsecaea	compactum		031	02	1
Fusarium	avenaceum		032	02	1
	chlamydosporium		032	03	1
	conglutinas		032	05	1
	lateutium		032	04	1
	species		032	01	1
Fusidium	griseum		033	02	1
	species		033	01	1
Geotrichum	candidum		034	02	1
	species		034	01	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Gillmaniella	humicola		035	02	1
	species		035	01	1
Gliomastix	species		036	01	1
Gliocladium	deliquescens		111	03	1
	virens		111	02	1
Hansfordia	togoensis		037	02	1
Haplobasidion	lelebae		038	03	1
	thalictri		038	02	1
	species		038	01	1
Harposporium	species		130	01	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Helicodendron	species		039	01	1
Helicosporium	species		040	01	1
Helminthosporium	nodulosum		041	02	1
Hendersonia	species		042	01	1
Hormiactis	alba		043	02	1
	species		043	01	1
Hyalodendron	species		044	01	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Idriella	species		045	01	1
Illiosporium	species		046	01	1
Kabatiella	species		137	01	1
Leptosphaerulina	species		047	01	1
Libertilla	species		122	01	1
Melanconium	species		127	01	1
Melanopsamma	pomiformis		133	02	1
Microascus	intermedus		138	02	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Micromonospora	fusca		048	02	1
	species		048	01	1
Microsporum	canis		049	02	1
Microthecium	retisporum	inferior	050	02	2
Monilia	species		124	01	1
Monocillium	species		051	01	1
Mucor	globosus		052	03	1
	hiemalis		052	05	1
	lamprosporum		052	02	1
	racemosus		052	04	1
	species		052	01	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Myrothecium	indicum		053	02	1
	species		053	01	1
Nigrospora	oryzae		054	04	1
	panici		054	02	1
	sphaerica		054	03	1
	species		054	01	1
Nodulisporium	species		055	01	1
Oedocephalum	species		056	01	1
Oidiodendron	griseum		057	02	1
	species		057	01	1
Ostracoderma	species		058	01	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Paecilomyces	elegans		059	02	1
	carneus		059	11	1
	flavescens		059	09	1
	griseoviridis		059	03	1
	ochroceus		059	10	1
	parvus		059	08	1
	roseobus		059	04	1
	terricola		059	05	1
	variabilis		059	06	1
	varioti		059	07	1
Penicillium	aurantio-virens		061	02	1
	aurantio-violaceum		061	39	1
	brevi-compactum		061	37	1
	capsulatum		061	35	1
	camberti	rogeri	061	36	2
	chevalieri		061	54	1
	chrysogenum		061	03	1
	citrium		061	04	1
	claviforme		061	05	1
	corylophilum		061	06	1
	corymbiferum		061	07	1
	crustosum		061	08	1
	cyclopium		061	09	1
	decumbens		061	40	1
	digitatum		061	41	1
	duclauxi		061	10	1
	expansum		061	11	1
	frequentans		061	12	1
	funiculosum		061	22	1

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Penicillium	fuscum		061	31	1
	granulatum		061	13	1
	implacatum		061	24	1
	islandicum		061	46	1
	italicum		061	14	1
	lanoso-coeruleum		061	26	1
	lanoso-griseum		061	32	1
	lanosum		061	27	1
	lavendulum		061	42	1
	lilacinum		061	15	1
	multicolor		061	44	1
	nalgievensis		061	53	1
	notatum		061	16	1
	ochraceum		061	48	1
	ochro-chloron		061	52	1
	palitans		061	43	1
	purpurogenum		061	17	1
	purpurrescens		061	23	1
	raistrickii		061	18	1
	restrictum		061	49	1
	roqueforti		061	30	1
	simplicissima		061	33	1
	spinulosum		061	25	1
	steckii		061	20	1
	stipitatum		061	51	1
	stoloniforum		061	34	1
	tardum		061	21	1
	variabile		061	28	1
	vermiculatum		061	50	1
	verruculosum		061	19	1
	vinaceum		061	38	1
	virdicatam		061	47	1
	waksmani		061	45	1
	species		061	01	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Periconia	digitata		062	06	1
	igniaria		062	02	1
	lateralis		062	03	1
	minutissima		062	04	1
	venezuelana		062	05	1
	species		062	01	1
Pestalotia	species		065	01	1
Petriella	species		121	01	1
Phialophora	jeanselmei		066	02	2
	species		066	01	1
Phyalocephala	species		129	01	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Pyrenophora	tritici-repentis		125	01	1
Phoma	glomerata		068	02	1
	herbarum		068	03	1
	species		068	01	1
Phomatosphora	berkeleyi		070	02	1
Phomopsis	species		071	01	1
Phyllosticta	species		072	02	1
Pithomyces	atro-olivaceus		073	03	1
	chartarum		073	05	1
	maydicus		073	02	1
	species		073	01	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Pseudotorula	species		076	01	1
Ramularia	species		077	01	1
Rhinocladiella	atrovirens		078	02	1
	species		078	01	1
Rhizopus	oryzae		079	02	1
Sadasiviania	species		080	01	1
Saturnomyces	species		081	01	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Scolocobasidium					
	constrictum		082	02	1
	humicola		082	04	1
	verruculosum		082	03	1
	species		082	01	1
Scopulariopsis	brevicaulis		083	02	1
	species		083	01	1
Selenophomia	species		132	01	1
Septonema	species		084	01	1
Sordaria	fimicola		085	02	1
	species		085	01	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Sphaeriales	species		126	01	1
Sphaeropsis	species		086	01	1
Spicaria	species		087	01	1
Spegazzinia	tessarthra		088	02	1
	species		088	01	1
Sporothrix	species		089	01	1
	species 2		089	02	1
Sporonema	species		131	01	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Sporormia	splendens		115	02	1
Staphospora	species		128	01	1
Staphylotrichum	coccosporum		090	02	1
	species		090	01	1
Streptomyces	section retinaculum - apertum		091	04	1
	section rectus flexibilis		091	03	1
	section spira		091	02	1
	species		091	01	1
Streptosporangium	roseum		092	02	1
Stilbum	species		093	01	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Syncephalastrum	racemosum		094	02	1
Tetraploa	ellisii		134	02	1
Thermoactinomyces	species		117	01	1
Thermomonospora	virdis		118	02	1
Thysanophora	penicilloides		095	02	1
Tilletiopsis	species		096	01	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Torula	herbarum		097	02	1
	species		097	01	1
Torulomyces	lagena		098	02	1
	species		098	01	1
Trichocladium	species		100	01	1
Trichoderma	koningi		101	02	1
	lignorum		101	04	1
	t. viride		101	03	1
	species		101	01	1
Trichophyton	mentagrophytes		102	02	1
	rubrum		102	03	1
Trichothecium	roseum		135	02	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Ulocladium	botrytis		103	02	1
Varicosporium	species		104	01	1
Vermicularia	species		110	01	1
Verticillium	species		105	01	1
Wallemia	ichthyophage		106	02	1
Zygosporium	masonii		107	02	1
Zythia	species		119	01	1

04 - FILAMENTOUS FUNGI

GENUS	SPECIES	VARIETY	COLUMNS 35,36,37	39,40	42
Unidentified	dematiaceous sterile mycelium		108	02	2
		1	108	02	3
		2	108	02	4
		3	108	02	5
		4	108	02	6
	filamentous fungi		108	01	1
	moniliaceous sterile mycelius		108	03	2
		1	108	03	3
		2	108	03	4

MICROBIOLOGY

DATA FORM INSTRUCTIONS

CONTENTS

1. INTRODUCTION

The purpose of the Microbiology Data form is to allow information from the various microbiology labs to be reported in such a way that it may be readily key punched and then entered in a computer storage system. This requires that the information be coded as explained in the Microbiology Data Card Format and the various copies handled as described in this instruction sheet.

1. Disposition of Copies

The Microbiology Data Form consists of six copies which are identical except for color and a notation in the lower right corner indicating the intended use. Beginning with the original (copy 1) the designations are:

Copy 1 - Complete/Contractor copy	(white)
Copy 2 - Complete/JSC file	(blue)
Copy 3 - Bacteriology copy	(green)
Copy 4 - First partial	(yellow)
Copy 5 - Second partial	(pink)
Copy 6 - Initiator copy	(golden rod)

Since evaluation of a given sample may involve more than one lab, provision has been made to allow partial reports. Any unneeded copies may be discarded.

2. Open Lists

The codes listed for each of the items on the Microbiology Data Card Format sheet are intended to uniquely designate each possible response for that item. If additional responses are needed, these can be coded and added to the list by data collection personnel.

3. Abbreviations

Some items (e.g., Sample Type, Col. 19) require a written as well as a coded response. This provides a means for checking the consistency of the response (i.e., the code should match the word). Acceptable abbreviations are indicated by underlining on the Data Card Format sheet.

4. Missing Data

If the appropriate response for a given item is not available because of accident or error, that item should be given the code for "datum missing" which in most cases is all zeros, and in every case is clearly indicated. Note that this is different than "not applicable".

Blank columns are permissible on partial reports, but not on the final report (copies 1 and 2). Any item still missing when the final report is submitted should be shown as "datum missing".

5. Explanation of Coded Items

It is important to use code exactly as described in the Microbiology Data Card Format and to make entries in all appropriate columns, even if the response might be "not applicable". This allows those handling the reports to distinguish among incomplete reports, non-applicable items, and missing data. Do not omit leading zeros; they are a part of the code also.

Columns 1-2: Identifies the lab area from which the information comes, this becomes a part of the ID number of this report. This number is to be assigned by the initiating lab, even though the report might be updated in other labs.

Columns 3-7:	Preprinted ID number which is used to link the lab worksheets, the report forms, the IBM cards punched from these forms, and ultimately the card image on magnetic tape. This number must be transfered to the lab worksheet.
Columns 8-9:	Identifies the technician making the initial report.
Column 10:	This space may be ignored; except in the case of the SMEAT food study as explained below.
Column 12:	Identifies the test (e.g., SMEAT, SL-2, SL-3, SL-4) in which the data originated.
Columns 13-17:	The Julian date of the sample collection, e.g. June 21, 1972, is 173-72.
Columns 24-25:	Codes 00, 01, 02, 05, 06, 08, 09 constitute full reporting of quantitation; if these are used, draw a line thru columns 27-31.
Columns 27-31:	If 4,7, or 10 appears in columns 24-25, enter the appropriate quantitation in scientific notation. If the colonies are TNTC, enter the value of the last dilution in columns 27-31. Use zeros to avoid leaving any blank columns.
Column 48:	If a 0, 1, 2, or 3 are coded in column 48, a line should be drawn through "boxes" 49 thru 72.
Column 49-71:	Enter the phage type in the usual notation. Use a zero in unneeded columns to right justify within each triplet boxes; e.g.: 32A/052/053/60B. Draw a line through any unused boxes.

6. Update ID - Delete ID

If it is found for any reason (such as summing of counts to get correct quantitation or correcting mistakes) that previously reported data must be changed, proceed as follows: Make out a new data form with the correct data and at the bottom under the Delete ID section, indicate the complete number of all previously submitted data forms which must be deleted from the data system. The Update ID column at the bottom of the form is not to be used at this time.

2. MICROBIOLOGY DATA CARD FORMAT

Columns	Contents	Code	Description
1-2	Lab area	01 -	Crew aerobic bacteriology
		02 -	Crew anaerobic bacteriology
		03 -	Crew mycology
		04 -	Environmental bacteriology
		05 -	Environmental mycology
		06 -	Crew mycoplasma
		07 -	Crew virology
		08 -	Serology
		09 -	Crew parasitology
		10 -	IMSS - Bacteriology
		11 -	IMSS - Mycology
		12 -	SMEAT food
		13 -	Skylab food
3-7	Identification Number		(pre-numbered)
8-9	Technician		See appendix D
10	Report status		IGNORE, except for Skylab food study, use these codes only:
		1 -	Frozen 0 hours
		2 -	Frozen 4 hours
		3 -	Frozen 8 hours
		4 -	Frozen 24 hours
		5 -	Control
		6 -	A Can
		7 -	B Can
12	Test number	1 -	SMEAT
		2 -	Skylab 2
		3 -	Skylab 3
		4 -	Skylab 4
13-15	Sample Date		Day of year
16-17	Sample Date		Year
19	Sample Type	0 -	Datum missing
		1 -	Regular (crew)
		2 -	Illness contingency
		3 -	Hardware contingency
		4 -	OWS preflight
		5 -	CM preflight
		6 -	CM postflight
		7 -	IMSS preflight

Columns	Contents	Code	Description
		8	- IMSS mid-mission (MM)
		9	- IMSS end of mission (EM)
		10	- IMSS Illness contingency
20-21	Sample Source	00	- Datum missing
		01	- Conrad
		02	- Kerwin
		03	- Weitz
		04	- McCandless
		05	- Musgrave
		06	- Schweickhart
		07	- Air
		08	- Hardware
		09	- Special Studies
		10	- Bean
		11	- Garriott
		12	- Lousma
		13	- Carr
		14	- Gibson
		15	- Pogue
		16	- Brand
		17	- Lenoir
		18	- Lind
22-23	Sample Area	00	- Datum missing
		CREW (sample type 1)	
		01	- Neck
		02	- Nasal
		03	- Ear
		04	- Axilla
		05	- Hands
		06	- Umbillicus
		07	- Groin
		08	- Toe Web
		09	- Urine
		10	- Gargle
		11	- Throat Swab
		12	- Feces
		OWS (sample type 4)	
		15	- MDA S190
		18	- MDA 124
		17	- MDA Con. Pan. 105
		24	- MDA inside Vent. Duct by CSM hatch
		14	- MDA 129
		19	- MDA 143
		07	- ATM Panel
		08	- MDA Tape Rec. #2, 149

Columns	Contents	Code	Description

OWS (sample type 4) continued
- 21 - MDA 126
- 23 - MDA rim next to pan. 301
- 16 - MDA 150
- 20 - MDA 192
- 26 - AM hatch rim entering OWS
- 25 - AM suit util. sys. 317
- 27 - AM rim
- 28 - AM window
- 51 - MDA hatch 100, CSM entry
- 50 - MDA ledge
- 55 - OWS food cab. 551
- 46 - OWS water pur. equip. 505
- 45 - OWS solar photog. unit 597
- 48 - OWS UV astro. mirror cover 593
- 53 - OWS locker 444
- 54 - OWS locker 446
- 56 - OWS locker 448
- 57 - OWS locker 400
- 49 - Tank 10
- 47 - Tank 01
- 52 - OWS light switch 630
- 38 - OWS, hand rail waste mgt.
- 39 - OWS, lip of housing above locker 802
- 37 - OWS, speaker intercom 903
- 33 - OWS, window vent valve sill PNL 704
- 35 - OWS, top of food table
- 34 - OWS, Urine receiver
- 36 - OWS, trash disp. airlock lid
- 29 - OWS, pressure dev. next to ch. SW. LBNPD
- 30 - OWS, front of ergometer
- 32 - OWS, Box 628 cover
- 31 - OWS, radiant heater #4
- 41 - Air plenum dome
- 40 - Air plenum ledge
- 43 - Air plenum crotch area
- 42 - Air plenum crotch area
- 44 - Air plenum dome

CM (sample type 5,6)
- 58 - CM, left X-X head strut
- 59 - CM, right X-X head strut
- 60 - CM, crew couch, right-hand stabilizer beam
- 61 - CM, crew couch, left-hand stabilizer beam
- 62 - CM, right-hand rotational hand controller pistol grip (both sides)

Columns	Contents	Code	Description

CM (sample type 5, 6) continued

- 63 - CM, left-hand rotational hand controller pistol grip (both sides)
- 64 - CM, right-hand girth shelf
- 65 - CM, panel 325
- 66 - CM, left-hand girth shelf (above U3)
- 67 - CM, cover plate, ordeal cable stowage locker (U3)
- 68 - CM, volume B1 (above snaps)
- 69 - CM, water dispenser/fire extinguisher assy (barrel area)
- 70 - CM, top of locker A8 (AEB)
- 71 - CM, ledge below window 5
- 72 - CM, volume R6
- 73 - CM, below window 5, right of fire port above volume R13

SUITS

- 74 - Suit - left arm
- 75 - Suit - right leg
- 76 - Suit - groin area
- 77 - Suit - chest area
- 78 - Pink neck (liner at top of zipper)
- 79 - Brown growth in leg liner (calf area)
- 80 - Leg liner (thigh area)
- 81 - Collar neck
- 82 - Liner near label
- 83 - Near base of zipper on inside in crevice (front zipper neck area)
- 84 - Outside in chest area
- 85 - Back outside in chest area
- 86 - Inner zipper on back, lower part
- 87 - Leg knee area - outside
- 88 - Outside sock - toe area
- 89 - Inner side front zipper and liner (chest area)

IMSS (sample type 7, 8, 9, 10)

- 01 - Nose
- 02 - Throat
- 03 - Ear
- 04 - Toes
- 05 - OWS hatch - 1 min. (air)
- 06 - OWS hatch - 5 min. (air)
- 07 - OWS hatch - 10 min. (air)
- 08 - Exps. area - 1 min.(air)
- 09 - Exps. area - 5 min.(air)
- 10 - Exps. area - 10 min. (air)

Columns	Contents	Code	Description

IMSS (sample type 7, 8, 9, 10) continued
- 11 - Site 1e or 1E
- 12 - Site 2e or 2E
- 13 - Site 3e or 3E
- 14 - Site 4e or 4E
- 15 - Site 5e or 5E
- 16 - Site 6e or 6E
- 17 - Site 7e or 7E
- 18 - Site 8e or 8E
- 19 - Site 9e or 9E
- 20 - Site 10e or 10E
- 21 - Site 11e or 11E
- 22 - Site 12e or 12E
- 23 - Site 13e or 13E
- 24 - Site 14e or 14E
- 25 - Site 15e or 15E

FOOD (sample source 08)
- 01 - Applesauce
- 02 - Asparagus
- 03 - Bacon Wafers
- 04 - Beef Hash
- 05 - Biscuit
- 06 - Black Coffee
- 07 - Butterscotch Pudding
- 08 - Canadian Bacon and Applesauce
- 09 - Catsup
- 10 - Cheddar Cheese Crackers
- 11 - Chicken and Gravy
- 12 - Chicken and Rice
- 13 - Cocoa
- 14 - Cocoa Flavored Instant Breakfast
- 15 - Coffee Cake
- 16 - Cream of Tomato Soup
- 17 - Cream Style Corn
- 18 - Creamed Peas
- 19 - Dried Apricots
- 20 - Dry Roasted Peanuts
- 21 - Filet Mignon
- 22 - Fruit Jam
- 23 - German Potato Salad
- 24 - Grape Drink
- 25 - Grapefruit Crystals
- 26 - Green Beans
- 27 - Ham and Cheese Crackers
- 28 - Ham Sandwich Spread
- 29 - Hard Candy
- 30 - Hot Dogs
- 31 - Lemonade

Columns	Contents	Code	Description
		FOOD (sample source 08) continued	
		32	- Lemon Pudding
		33	- Lobster Newburg
		34	- Macaroni and Cheese
		35	- Mashed Potatoes
		36	- Mashed Sweet Potatoes
		37	- Mints
		38	- Orange Crystals
		39	- Orange Drink
		40	- Peach Ambrosia
		41	- Peaches
		42	- Peanut Butter
		43	- Pears
		44	- Pea Soup
		45	- Pineapple
		46	- Pork and Scalloped Potatoes
		47	- Pork Tenderloin w/Dressing
		48	- Potato Soup
		49	- Pre-Buttered Roll
		50	- Prime Rib
		51	- Rice Krispies
		52	- Salmon Salad
		53	- Sausage Patties
		54	- Scrambled Eggs
		55	- Shrimp Cocktail
		56	- Sliced Dried Beef
		57	- Spaghetti and Meat Sauce
		58	- Stewed Tomatoes
		59	- Strawberries
		60	- Sugar Coated Corn Flakes
		61	- Sugar Cookie Wafers
		62	- Tea with Lemon and Sugar
		63	- Tuna Sandwich Spread
		64	- Turkey Rice Soup
		65	- Vanilla Ice Cream
		66	- Vanilla Wafers
		67	- Veal and BBQ Sauce
		68	- White Bread
		69	- Turkey and Gravey
		70	- Chili with Meat
24-25	Quantitation	00	- Datum missing
		01	- Less than 10
		02	- Less than 100
		03	- Less than 1000
		04	- TNTC
		05	- Heat shock
		06	- Concentrate
		07	- Quantitation follows in columns 27-31

Columns	Contents	Code	Description
		08 -	Quantitation unsuccessful
		09 -	Not applicable
		10 -	Less than 30; quantitation follows
		11 -	Present, not quantified
		12 -	Contact plates (100 mm)
27-31	Quantitation		Use correct scientific notation when applicable; e.g. 1124 colonies should be coded as : [1].[12] x 10 [03] ,
32-33	Organism group	00 -	Datum missing
		01 -	Aerobic bacteria
		02 -	Anaerobic bacteria
		03 -	Yeast
		04 -	Filamentous fungi
		05 -	Parasite
		06 -	Virus
		07 -	Mycoplasma
35-37	Organism genus		See appendix A
39-40	Organism species		See appendix A
42	Organism variety		See appendix A
43	Medical significance	0 -	Datum missing (see appendix C)
		1 -	No
		2 -	Yes
44	Hemolysis	0 -	Datum missing
		1 -	Not applicable (NA)
		2 -	Alpha
		3 -	Beta
		4 -	Gamma
45	Coagulase	0 -	Datum missing
		1 -	Not applicable (NA)
		2 -	Positive
		3 -	Negative
46-47	Gram		See appendix B
48	Phage Type	0 -	Datum missing
		1 -	Not applicable
		2 -	Not typable
		3 -	Typable; type follows
49	Phage Type		

Columns	Contents	Code	Description
72	Titer	1 - 10x 2 - 100x 3 - 1000x 4 - 10000x	

APPENDIX B

GRAM CODES

APPENDIX B

Codes for Gram columns 46-47

00 - Datum missing
01 - Not applicable
02 - Gram positive rod
03 - Gram negative rod
04 - Gram positive cocci in pairs or chains
05 - Gram negative cocci in pairs or clusters
06 - Gram positive cocci in clusters
07 - Gram negative cocco-bacilli
08 - Gram positive sporulating rod
09 - Gram negative sporulating rod
10 - Gram positive rod, bifidated end
11 - Gram negative rod, rounded ends
12 - Gram negative rod, tapered ends
13 - Gram positive branching rods

APPENDIX C

MEDICALLY IMPORTANT ORGANISMS

APPENDIX C

Organisms to be Coded as MEDICALLY IMPORTANT*

GENERAL

1. ALL ORGANISMS isolated from CONTINGENCY SPECIMENS

SKIN

1. Staph. aureus
2. Strep. spp. (B-hemolytic, group A)
3. Strep. spp. (B-hemolytic, not group A if predominant organism)
4. Proteus spp.
5. Pseudomonas spp.
6. Clostridium spp.
7. Shigella spp.
8. Salmonella spp.
9. Moraxella spp.
10. Herellea spp.
11. Candida albicans
12. Aspergillus spp.

THROAT

1. Strep. spp. (B-hemolytic, group A)
2. Strep. spp. (B-hemolytic, not group A but predominant organism)
3. Strep. spp. (A or G hemolytic if predominating organism)
4. Staph. aureus
5. Diplococcus pneu.
6. Proteus spp.
7. Pseudomonas spp.
8. Klebsiella spp.
9. Other coliforms
10. Haemophilus spp.
11. Neisseria mening.
12. Cory. diph.
13. Candida albicans

URINE

1. ANY ORGANISM $\geq 10^5$ per ml
2. ANY GRAM NEG. $\geq 10^3$ per ml
3. Salmonella spp. (regardless of count)
4. Shigella spp. (regardless of count)

5. Candida albicans (regardless of count)
6. Proteus spp. (regardless of count)
7. Pseudomonas spp. (regardless of count)
8. Herella spp. (regardless of count)
9. Gonococcus (regardless of count)
10. Mima polymor. (regardless of count)
11. Strep. spp. (B-hemolytic, A or not A)

* All organisms associated with a specific disease or syndrome (e.g. Myco. tuberculosis or Gonococcus) should be reported as medically significant regardless of the specimen or quantitation.

APPENDIX D

TECHNICIAN CODES

APPENDIX D

TECHNICIAN CODES

Microbiology

01	Jones, Sandra
02	Decelle, Glee
03	Bryan, Nem
05	Carter, Edward
06	
07	Poel, Corinne
08	Gehring, Nina
09	Groves, Theron
10	Carmichael, Carolyn
11	Henney, Mary
13	Dropp, Kathryn
15	Molina, Thomas
20	McQueen-Graves

Virology - Tissue Culture

50	Gammage, Bryon
51	
52	Pipes, Florence